

SWAINSON'S HAWK

Buteo swainsoni

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Management Status: Federal: None
California: Threatened (CDFG, 1998)

General Distribution:

Swainson's Hawks breed regularly from southwestern Canada to northern Mexico (Godfrey, 1986; Semenchuk, 1992; Howell and Webb, 1995; Smith, 1996; England et al., 1997). The western limit of their breeding distribution extends from eastern Washington, eastern Oregon, and northeastern California, through Nevada to northern and southeastern Arizona (Bloom, 1980; Monson and Phillips, 1981; Alcorn, 1988; Gilligan et al., 1994; Price et al., 1995; England et al., 1997). The eastern limit of the breeding range extends to western Minnesota, eastern Nebraska, central Kansas, central Oklahoma, and central Texas (Oberholser, 1974; Janssen, 1987; Thompson and Ely, 1989; Baumgartner and Baumgartner, 1992). Apparently isolated outlier populations also occur in: (1) the interior valleys of British Columbia (Campbell et al., 1990); (2) the Central Valley of California (Bloom, 1980); (3) west-central Missouri (Robbins and Easterla, 1992); and (4) in northeastern Illinois (Herkert, 1992).

Nearly all Swainson's Hawks spend the northern hemisphere winter in South America. The primary winter range is on the pampas of Argentina (Blake, 1977). Small numbers are also reported irregularly during the winter in Brazil (Sick, 1993), Colombia (Hilty and Brown, 1986), Costa Rica (Stiles and Skutch, 1989), Panama (Ridgely and Gwynne, 1989), and Mexico (Howell and Webb, 1995). Small populations regularly winter in southern Florida (Stevenson and Anderson, 1994) and in the Sacramento-San Joaquin River Delta of central California (Yee et al., 1991; Herzog, 1996). Museum specimens and band recoveries also indicate small numbers of wintering birds (primarily immatures) in New Mexico, Texas, and Louisiana (Browning, 1974). Sight records of wintering immature birds require careful evaluation due to potential confusion with other species (Garrett and Dunn, 1981; England et al., 1997); Browning (1974) estimated <18% of winter sightings in North America were acceptable.

Historically, the Swainson's Hawk breeding range in California included (1) the Great Basin including the Modoc Plateau, (2) the Sacramento and San Joaquin Valleys, (3) along the coast in Marin, Monterey, Ventura, Los Angeles, and San Diego counties, and (4) a few scattered sites in the Colorado and Mojave deserts (Bloom, 1980). Today, Swainson's Hawk still nest in most previously occupied regions of the state, but the number of breeding birds has been greatly reduced throughout major portions of the range (e.g., Central Coast Ranges), and the species has been extirpated in coastal southern California (Bloom, 1980). Only the Central Valley and Modoc Plateau still support more than a few isolated pairs. In California, migrating flocks of up to 100+ Swainson's Hawks may be observed away from the major mountain ranges during the spring and fall. These observations have become less frequent as the overall population has declined (Garrett and Dunn, 1981; Small, 1994). Approximately 30 birds have wintered in the Sacramento-San Joaquin River Delta annually since 1991 and are the only confirmed regularly wintering population in California (Yee et al., 1991; Herzog, 1996).

Distribution in the West Mojave Planning Area:

All documented nesting attempts by Swainson's Hawks in the WMPA are in the Antelope, Victor, and Apple valleys from near Palmdale and Lancaster to Adelanto and Victorville. Within this range, they nest in extremely low densities and apparently not in all years in desert scrub vegetation with an overstory of Joshua Trees (*Yucca brevifolia*) and in Fremont Cottonwoods (*Populus fremontii*) along stream courses or planted as windbreaks. The breeding distribution in the WMPA may be unchanged since the earliest reported records. Grinnell and Miller (1944) reported that Swainson's Hawks are "[a]pparently scarce in summer in Colorado and Mohave deserts," but do not mention nesting within the WMPA. In his review of the status of Swainson's Hawks in California, Bloom (1980) reported nine historical nest records from the WMPA. Since 1979, nesting attempts have been reported from near Lancaster and Palmdale in 1979-83 and 1991-97 (K. Garrett and K. Molina pers. comm.). Another recent report of possible nesting was in the Fremont Valley, Kern County, on May 26, 1986 (McCaskie, 1986); nesting was not confirmed and no subsequent observations have been reported from this part of the WMPA. Flocks of migrating Swainson's Hawks are may be found in the WMPA during either the spring or fall (Garrett and Dunn, 1981; Small, 1994).

Natural History:

Unlike any other buteos in the western United States (e.g., Red-tailed Hawk, Red-shouldered Hawk), Swainson's Hawks migrate long distances, are highly gregarious, and are largely insectivorous. Their annual round-trip migration between North America and Argentina covers approximately 12,500 mi (20,000 km; England et al., 1997). Birds typically return to nest sites in early March to April (later in more northern areas), immediately form pairs, and begin the nesting cycle. Nest building typically begins 7-15 days after arrival and lasts for about one week (Fitzner, 1978). Clutch sizes range from 1-4 eggs with an average size of about 2.5 eggs (Bechard, 1983; Olendorff, 1973). In Colorado, egg-laying through fledging lasted 99-110 days (Olendorff, 1973). The average fledging date in Butte Valley on the Modoc Plateau was 18 August, and in the Central Valley of California fledging occurs between 1 July and mid-August (Estep, 1989). Migratory flocks begin to form in late August and September, and most birds are apparently on the wintering grounds by November.

The plumage coloration of Swainson's Hawks is polymorphic and is called light, dark, or rufous based on coloration of the under parts (Palmer, 1988). Color variation is almost continuous from lightest to darkest morphs making these categories convenient but somewhat arbitrary (Palmer, 1988). Most birds are light to intermediate in color. In flight, these individuals are easily distinguished from other buteos in the Mojave Desert by an underwing pattern of dark flight feathers contrasting with paler wing-linings. The belly is light in contrast to the dark upper breast giving pale morph birds the appearance of having a "bib." Dark morphs are more difficult to identify but even in these birds, the undertail coverts are buffy white, barred with dark brown; dark morph birds of other buteos have dark undertail coverts. In flight, the overall appearance of a Swainson's Hawk, whatever color morph, is slimmer with a thinner body and narrower wings compared to other North American buteos. Also, when soaring, they hold their wings in a dihedral reminiscent of a Turkey Vulture (*Cathartes aura*).

Swainson's Hawks are relatively small buteos (males 25-33 oz. [693-936 g] and females 33-48 oz. [937-1,367 g]; Palmer, 1988) that take a variety of mammals, birds, lizards, snakes,

amphibians, and insects. Food items delivered to nestlings very similar to other buteos because they are dominated by mammals and to a lesser extent by birds. The specific prey species taken vary from location to location, but are generally dominated by ground squirrels, jackrabbits, cottontails, small rodents, and birds. In northeastern California, the biomass of the diet was dominated by voles (*Microtus* sp.) and Belding's ground squirrel (*Spermophilus beldingi*), but also included numerous grasshoppers (Bloom, 1980; Woodbridge, 1991). In the Central Valley, the diet consisted of voles, California ground squirrel (*Spermophilus beecheyi*), valley pocket gopher (*Thomomys bottae*), Mourning Dove (*Zenaidura macroura*), and Ring-necked Pheasant (*Phasianus colchicus*) (Estep, 1989).

The diet of adult Swainson's Hawks has not been well documented during the period while they provision young in the nest. Insects are recorded sporadically at the nest, but insects may be taken by adults while foraging away from the nest (Woodbridge, 1991). Outside the breeding season, Swainson's Hawks are primarily insectivores consuming grasshoppers, crickets, and dragonflies (Munro, 1929; Johnson et al., 1987; Jaramillo, 1993; Woodbridge et al., 1995; Serracin Araujo and Tiranti, 1996). This pattern includes postbreeding birds, migratory birds, nonbreeding or prebreeding birds arriving on the breeding grounds, and birds wintering in South America. Thus, insects are an important part of the diet throughout the year.

The natural foraging habitat of Swainson's Hawks is relatively open stands of grass-dominated vegetation and relatively sparse shrublands. Trees are typically widely scattered or found in bands along riparian corridors. Much of the original habitat has been converted to either urban development or cultivated agricultural uses. Swainson's Hawks can forage agricultural fields with many types of crops. However, Schmutz (1987) found that this hawk is more abundant in areas of moderate agricultural development than in either grassland or areas of extensive agricultural development. Alfalfa fields are routinely used by foraging Swainson's Hawks (Estep, 1989; Woodbridge, 1991), but the ability of the hawk to any agricultural crop for foraging is a complex interaction of phenology and cultural practices (Schmutz, 1987; Estep, 1989; Woodbridge, 1991). Orchards and vineyards in general are not suitable foraging habitat for Swainson's Hawk due to the dense woody cover (Estep, 1989).

The home range of Swainson's Hawks is highly variable ranging from an mean of 1,534 acres (621 hectares) in southeastern Washington (Fitzner, 1978) to 9,978 acres (4,038 acres) in the Central Valley of California (Babcock, 1995). Larger home ranges are found in areas with unsuitable crops such as mature grain and row crops, orchards, and vineyards (Bechard, 1982; Estep, 1989; Babcock, 1995). The smallest home ranges are reported at nest sites near alfalfa, fallow fields, and dry pasture (Bechard, 1982; Estep, 1989; Woodbridge, 1991). Home ranges become larger seasonally when crops mature, providing cover, and making prey unavailable (Bechard, 1982; Estep, 1989; Woodbridge, 1991; Babcock, 1995). The largest home ranges belong to males and the smallest to females with the smallest female home ranges an order of magnitude smaller than the largest used by males (Fitzner, 1978; Estep, 1989; Andersen, 1995; Babcock, 1995).

Throughout the range of the species, Swainson's Hawks nest almost exclusively in trees. In a few instances, they have been recorded nesting on cliffs, coulees (i.e., a deep gulch or ravine with sloping sides), structures, and the ground, but these sites are rarely used (England et al., 1997). Nest trees are typically located on the edges between woodland and either grass or shrubland habitats or in isolated trees or clumps of trees in open terrain (Estep, 1989). A survey of nesting birds in California during 1979 revealed that Swainson's Hawks nested almost

exclusively in large, sparsely vegetated flatlands characterized by valleys, plateaus, broad floodplains, and large expanses of desert. Only three territories were found in low rolling hills, and none were found nesting in the mountains, except for certain large valleys. Single trees or riparian areas were preferred for nesting. None were found nesting in densely wooded areas unless adjacent to sparsely vegetated plains or agricultural areas with suitable foraging habitat (Bloom, 1980).

In central and northeastern California, most Swainson's Hawk nests are located in cottonwood (*Populus* sp.), oaks (*Quercus* spp.), sycamore (*Platanus racemosa*), or willows (*Salix* spp.; Bloom, 1980). In urban landscapes, a variety of ornamental species, especially conifers, are selected for nest sites (England et al., 1995), and in the Mojave Desert, Joshua trees (*Yucca brevifolia*) are used (Bloom 1980). Nest trees near human habitations are used throughout the range of the species. Swainson's Hawks have been recorded nesting in urban landscapes in the Central Valley of California, but these sites are always within approximately 5 mi (8 km) of suitable foraging habitat and the reproductive success is lower than adjacent rural-nesting birds (England et al., 1995).

Habitat Requirements:

Breeding Swainson's Hawks have three general habitat requirements: (1) suitable foraging habitat with adequate prey, (2) nest sites, and (3) isolation from disturbances that may disrupt breeding activities. No quantitative information has been published on the habitat requirements of Swainson's Hawks in the Mojave Desert. In the WMPA, nesting opportunities are found in Joshua tree woodland, riparian woodland, and ornamental plantings. The primary nest trees are Joshua trees and Fremont cottonwoods, but other large trees could also be used, especially where planted in narrow bands such as agricultural windbreaks (e.g., cottonwoods). In both the WMPA and the Eastern Mojave National Preserve, Swainson's Hawks forage on suitable prey within the Joshua tree woodlands. In addition, agricultural areas in the WMPA with suitable crop types and located in proximity to nest sites may meet Swainson's Hawk foraging requirements. As evidenced by urban and rural nesting birds in the Central Valley, some individual Swainson's Hawks are able to tolerate the routine disturbances associated with automobile traffic on city streets and rural highways, agricultural machinery, and small airplanes, especially if they are present and on-going at the time of nest site selection (A. S. England). These and other disturbances can be disruptive if intermittent or if exceedingly loud or extensive.

Population Status:

At the end of the 19th century, Swainson's Hawks were considered to be a common to abundant breeding species in California (Sharp, 1902). By the early 1940s, ornithologists working in the state were already beginning to document breeding population declines (Grinnell and Miller, 1944). Bloom (1980) conducted the first statewide survey of Swainson's Hawks in California in 1979. He documented the existence of 110 active pairs, and estimated approximately 375 were present statewide. These data revealed that the remaining population centers were in the Great Basin in the extreme northeastern portion of the state and in the Central Valley, and that the species was nearly extirpated throughout large parts of its former range. The declines were greatest in the coastal southern California where Sharp (1902) had classified the species as abundant.

To measure the magnitude of the population decline, Bloom (1980) estimated the number of breeding pairs likely found in the state prior to intense urban and agricultural development by assuming that densities found in the Great Basin in 1979 were similar to what would have occurred elsewhere. The results indicated that (1) the historical population was 4,000-17,000 pairs, (2) the Central Valley remained an important population center, (3) the relative importance of the Great Basin population had increased because populations elsewhere had declined faster, and (4) assuming the lower historical population levels and the larger estimated 1979 population, Swainson's Hawks had declined by over 90 % in California.

A statewide survey conducted in 1988 generally supported Bloom's findings. Among 320 active territories, approximately 241 were in the Central Valley and 78 were in the Great Basin in northeastern California (Calif. Dep. Fish and Game, 1988). Estimates based on these data indicated a likely population of 430 pairs in the Central Valley and 100 pairs in the Great Basin. Five pairs were expected from the Owens Valley and five from the Mojave Desert. The species was considered extirpated from southern California and the coastal valleys. The total statewide population was estimated to be 550 breeding pairs in 1988. Additional surveys done in California during the 1990s indicate that the total statewide population is 500-1,000 breeding pairs. The latter estimates are higher than the estimate developed by Bloom (1980), but the difference may reflect increased survey effort and not a population increase.

Threats Analysis:

Several hypothesis have been suggested to explain the decline of Swainson's Hawks in California. Among them are: (1) mortality during migration and on the wintering grounds in South America; (2) poisoning by toxic chemicals, including pesticides, in South America; (3) eggshell thinning; (4) habitat loss on the wintering grounds; (5) disturbance on the breeding grounds; (6) loss or degradation of habitat on the breeding grounds; and (7) increased competition with other species. No single hypothesis provides an adequate explanation for the observed declines in California. Mortality due to acute toxicity from pesticides has been recently reported from Argentina where documented kills of 4,100 hawks were recorded in 1996 (Goldstein et al., 1996). This single die-off may have represented as much as 1 % of the world's population of Swainson's Hawks, and if the die-off covered a large area in South America, could have been as high as 5 % (Goldstein et al., 1996). Chronic exposure and bioaccumulation leading to eggshell thinning and other reproductive failures have not been documented in this species (Stendell et al., 1988; Risebrough et al., 1989).

One or more local factors on the breeding grounds in California are also presumed to be the reason for observed declines (Risebrough et al., 1989). Habitat loss and degradation are likely factors in some cases. For example, approximately 98 % of the original Central Valley riparian forest has been removed (Katibah, 1983) with similar losses of grasslands and other wetland habitats. The southern end of Central Valley has few trees due to agricultural clearing, and common crops such as vineyards and cotton are unsuitable foraging cover (Estep, 1989).

Habitat loss does not explain declines observed in the Mojave Desert, Central Coast Ranges, Southern Transverse Ranges, and parts of Oregon and Nevada. Many of these areas support apparently suitable habitat but Swainson's Hawks no longer breed there. Bloom (1980) estimated the historical population in the Mojave and Colorado Deserts at 270-1080 pairs. If these estimates are accurate, it could mean that Swainson's Hawk populations in this region have declined by over 95%. While these estimates are the best available, caution should be used when

characterizing local declines since they were calculated assuming nesting densities from different habitat types in another part of the range. The reason proposed by Bloom (1980) for the calculated declines in the Mojave Desert was that, “historically, the range of the Joshua Tree was larger, especially in Antelope Valley. As the tree’s range decreased, Swainson’s Hawk numbers probably decreased proportionately.” Some loss of Joshua tree woodland habitat in the Antelope, Victor, and Apple valleys has occurred as a result of urban and agricultural land development.

Within the WMPA, loss or degradation of nesting and foraging habitat is the primary threat to the small breeding population of Swainson’s Hawks. Continued loss of Joshua tree and riparian woodland habitats to urban and agricultural developments could further reduce or eliminate both nesting and foraging habitat. Habitat degradation could occur through a variety of mechanisms including, but not limited to:

Fires, which eliminate nesting opportunities in Joshua trees and riparian trees for decades until the vegetation, recovers

Off-highway vehicle use, which leads to a decrease in prey availability or prevents the long-term recruitment of new nest trees

Flood control projects that alter normal stream and wash hydrology leading to the loss of riparian habitat and nesting opportunities

Lowering of water tables that lead to the loss of nesting habitat or contribute to a decline in prey availability

Direct loss of Swainson’s Hawks may occur as a result of shooting, which historically contributed to the loss of birds but the frequency of which appears to be declining (England et al., 1997). Off-highway vehicle use and operation of loud equipment could disrupt nesting activities, especially if these sources of noise and disturbance occur intermittently or early in the nesting cycle. The limited data on the effects of pesticide use in North America on Swainson’s Hawks does not indicate this to be a threat. However, the role of acute poisoning in South America in the mortality of birds from California is unknown.

Biological Standards:

Due to the precipitous decline in nesting Swainson’s Hawks throughout California and due to the low numbers that breed in the entire Mojave Desert, it is extremely important that existing and potential nesting areas be surveyed, monitored, and protected. Management should include protecting nesting pairs to prevent disturbances that could disrupt nesting or reduce reproductive success and habitat protection to ensure an adequate prey base and nest sites are available. Recovery of the species in California and ultimate removal from the California list of Threatened Species will require a statewide solution. Long-term protection of a small breeding population in the WMPA and the East Mojave National Preserve should be a part of this effort to ensure that the breeding range of these species is not further reduced. Federal, State, County, City and local agencies should participate in development of a statewide recovery strategy for the Swainson’s Hawk and take the actions needed to ensure the Mojave Desert population contributes to this recovery.

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